

**WHAT IS CLAIMED IS:**

1           1. A telecommunications system having an application layer and a transport  
2 layer, the system comprising:

3           a first node which utilizes a first transport technology;

4           a second node which utilizes a second transport technology;

5           wherein the first transport technology and the second transport technology are  
6 interworked for facilitating establishment of a transport bearer between the first node  
7 and the second node without terminating or interworking with application control  
8 signaling in the application layer.

1           2. The system of claim 1, wherein the application layer executes a radio network  
2 layer procedure to initiate the transport bearer in a radio access network of a wireless  
3 telecommunications system.  
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1           3. The system of claim 1, further comprising a transport layer interworking  
2 gateway connected between the first node and the second node.

1           4. The system of claim 3, wherein the interworking gateway receives an  
2 establish request message carried by the first transport technology and converts an  
3 address of the second node borne by the establish request message to an address usable  
4 by the second transport technology, and wherein the interworking gateway employs the  
5 address usable by the second transport technology to send a bearer signaling message to  
6 the second node.

1           5. The system of claim 4, wherein the first technology is ATM and the second  
2 technology is internet protocol (IP).

1           6. The system of claim 5, wherein the bearer signaling message is in an IP  
2 bearer control protocol and includes a binding identifier obtained from the second node.

1           7. The system of claim 6, wherein after receipt of the bearer signaling message  
2 the second node sends an IP response message to the interworking gateway, the IP  
3 response message including information enabling establishment of a unidirectional  
4 connection from the interworking gateway to the second node.

1           8. The system of claim 7, wherein after receipt of the IP response message, the  
2 interworking gateway sends an establish confirmation message to the first node.

1           9. The system of claim 3, wherein the first node uses an address of the second  
2 node to determine an address for the interworking gateway, and wherein the first node  
3 sends a bearer signaling message to the interworking gateway.

1           10. The system of claim 9, wherein the bearer signaling message is in an IP  
2 bearer control protocol and includes an address of the second node, a binding identifier  
3 obtained from the second node, and IP connection information necessary for the  
4 interworking gateway to establish a unidirectional connection to the first node.

1           11. The system of claim 10, wherein upon receiving the bearer signaling  
2 message, the interworking gateway sends an establish request message towards the  
3 second node, and wherein upon receipt of the establish request message the second node  
4 sends an establish confirmation message toward the interworking gateway.

1           12. The system of claim 11, wherein the establish request message and the  
2 establish confirmation message are q.aal2 messages.

1           13. The system of claim 11, wherein upon receipt of the establish confirmation  
2 message the interworking gateway sends an IP response message to the first node, the  
3 IP response message including IP connection information necessary for the first node to  
4 establish a unidirectional connection to the interworking gateway.

1           14. The system of claim 1, wherein an interworking function interworks the first  
2 technology and the second technology at one of the first node and the second node.

1           15. The system of claim 1, wherein an interworking function interworks the first  
2 technology and the second technology at a node distinct from the first node and the  
3 second node.

1           16. The system of claim 1, wherein an interworking function interworks the first  
2 technology and the second technology using q.aal2 signaling.

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1 17. The system of claim 16, wherein one of the transport technologies is an  
2 internet protocol (IP), and wherein the interworking function involves using internet  
3 protocol (IP) specific signaling over an internet protocol (IP) network.

1 18. The system of claim 16, wherein one of the first and the second node is an  
2 internet protocol (IP) node, and wherein the interworking function involves using q.aal2  
3 signaling over an internet protocol (IP) network to/from the internet protocol (IP) node.

1 19. The system of claim 1, wherein the first node is an IP-connected node which  
2 attempts to establish the transport bearer using application level signaling, but when  
3 unsuccessful invokes an interworking function for establishing the transport bearer.

1 20. The system of claim 1, wherein the first node is an IP-connected node which  
2 includes its IP address and IP endpoint identifier for uplink traffic in an IP transport  
3 bearer container sent to the second node in an initiating application control message,  
4 wherein if an IP transport bearer container is received from the second node in an  
5 application control response message, the transport bearer is considered as being  
6 established, and otherwise the interworking function is invoked by the first node.

1 21. The system of claim 1, wherein an IP-connected node obtains address  
2 parameters of a transport layer interworking gateway from the transport layer  
3 interworking gateway for inclusion in application layer signaling to the first node.

1 22. The system of claim 21, wherein the first node is not an IP-connected node  
2 but the second node is an IP-connected node, wherein upon receipt of an initiating  
3 application message from the first node, the second node obtains from the transport  
4 level interworking gateway a network address of the interworking gateway and a  
5 binding identifier of the interworking gateway to send back to the first node, wherein  
6 the second node establishes a bidirectional IP connection with the interworking  
7 gateway; and wherein the first node uses the network address of the interworking  
8 gateway and the binding identifier of the interworking gateway to establish a connection  
9 with the interworking gateway.

1 23. The system of claim 1, wherein a tunneling mechanism is utilized to  
2 interwork the first technology and the second technology.

1        24. For use in a telecommunications system having an application layer and a  
2 transport layer, the system comprising a first node which utilizes a first transport  
3 technology and a second node which utilizes a second transport technology, a method  
4 comprising interworking the first transport technology and the second transport  
5 technology to facilitate establishment of a transport bearer between the first node and  
6 the second node without terminating or interworking with application control signaling  
7 in the application layer.

1        25. The method of claim 24, further comprising executing at the application  
2 layer a radio network layer procedure to establish the transport bearer in a radio access  
3 network (RAN) of a wireless telecommunications method.

1        26. The method of claim 24, further comprising a transport layer interworking  
2 gateway connected between the first node and the second node.

1        27. The method of claim 26, further comprising:  
2 receiving at the interworking gateway an establish request message carried by  
3 the first transport technology;  
4 converting an address of the second node borne by the establish request message  
5 to an address usable by the second transport technology;  
6 the interworking gateway employing the address usable by the second transport  
7 technology to send a bearer signaling message to the second node.

1        28. The method of claim 27, wherein the first technology is ATM and the  
2 second technology is an internet protocol (IP).

1        29. The method of claim 28, wherein the bearer signaling message is in an IP  
2 bearer control protocol and includes a binding identifier obtained from the second node.

1        30. The method of claim 29, further comprising, after receipt of the bearer  
2 signaling message, the second node sending an IP response message to the  
3 interworking gateway, the IP response message including information enabling  
4 establishment of a unidirectional connection from the interworking gateway to the  
5 second node.

1 31. The method of claim 30, further comprising, after receipt of the IP response  
2 message, the interworking gateway sending an establish confirmation message to the  
3 first node.

1 32. The method of claim 26, further comprising:  
2 the first node using an address of the second node to determine an address for the  
3 interworking gateway; and  
4 the first node sending a bearer signaling message to the interworking gateway.

1 33. The method of claim 32, wherein the bearer signaling message is in an IP  
2 bearer control protocol, and wherein the method comprises including in the IP bearer  
3 signaling message an address of the second node, a binding identifier obtained from the  
4 second node, and IP connection information necessary for the interworking gateway to  
5 establish a unidirectional connection to the first node.

1 34. The method of claim 33, further comprising:  
2 upon receiving the bearer signaling message, the interworking gateway sending  
3 an establish request message towards the second node; and  
4 upon receipt of the establish request message the second node sending an  
5 establish confirmation message toward the interworking gateway.

1 35. The method of claim 34, wherein the establish request message and the  
2 establish confirmation message are q.aal2 messages.

1 36. The method of claim 34, further comprising upon receipt of the establish  
2 confirmation message the interworking gateway sending an IP response message to the  
3 first node, the IP response message including IP connection information necessary for  
4 the first node to establish a unidirectional connection to the interworking gateway.

1 37. The method of claim 24, further comprising using an interworking function  
2 to interwork the first technology and the second technology at one of the first node and  
3 the second node.

1           38. The method of claim 24, further comprising using an interworking function  
2 to interwork the first technology and the second technology at a node distinct from the  
3 first node and the second node.

1           39. The method of claim 24, further comprising using q.aal2 signaling to  
2 interwork the first technology and the second technology.

1           40. The method of claim 39, wherein one of the transport technologies is an  
2 internet protocol (IP), and further comprising performing interworking using internet  
3 protocol (IP) specific signaling over an internet protocol (IP) network.

1           41. The method of claim 39, wherein one of the first and the second node is an  
2 internet protocol (IP) node, and further comprising performing interworking using  
3 q.aal2 signaling over an internet protocol (IP) network to/from the internet protocol (IP)  
4 node.

1           42. The method of claim 24, wherein the first node is an IP-connected node, and  
2 further comprising: the first node attempting to establish the transport bearer using  
3 application level signaling, but when unsuccessful the first node invoking an  
4 interworking function for establishing the transport bearer.

1           43. The method of claim 24, wherein the first node is an IP-connected node, and  
2 wherein the method further comprises:

3           the first node including its IP address and IP endpoint identifier for uplink traffic  
4 in an IP transport bearer container sent to the second node in an initiating application  
5 control message;

6           wherein if an IP transport bearer container is received from the second node in an  
7 application control response message, considering the transport bearer to be established,  
8 and otherwise invoking interworking by the first node.

1           44. The method of claim 24, wherein the second node is an IP-connected node,  
2 the method further comprising: obtaining address parameters of a transport layer  
3 interworking gateway from the transport layer interworking gateway for inclusion in  
4 application layer signaling to the first node.

1           45. The method of claim 44, wherein the first node is not an IP-connected node  
2 but the second node is an IP-connected node, the method further comprising:

3           upon receipt of an initiating application message from the first node, the second  
4 node obtaining from the transport level interworking gateway a network address of the  
5 interworking gateway and a binding identifier of the interworking gateway to send back  
6 to the first node;

7           the second node establishing a bidirectional IP connection with the interworking  
8 gateway; and

9           the first node using the network address of the interworking gateway and the  
10 binding identifier of the interworking gateway to establish a connection with the  
11 interworking gateway.

1           46. The method of claim 24, further comprising using a tunneling mechanism to  
2 interwork the first technology and the second technology.

1           47. A telecommunications system having an application layer and a transport  
2 layer, the application layer being a radio network layer, the system comprising:

3           a first node which is connected to use Internet Protocol;

4           a second node;

5           wherein the first node attempts to establish a transport bearer between the first  
6 node and the second node using application level signaling, but when unsuccessful  
7 invokes an interworking function in the transport layer for establishing the transport  
8 bearer.

1           48. The system of claim 47, wherein the first node includes its IP address and IP  
2 endpoint identifier for uplink traffic in an IP transport bearer container sent to the  
3 second node in an initiating application control message, and wherein if an IP transport  
4 bearer container is received from the second node in an application control response  
5 message, the transport bearer is considered as being established, and otherwise the  
6 interworking function is invoked by the first node.

1           49. The system of claim 47, further comprising a transport layer interworking  
2 gateway connected between the first node and the second node.

1           50. The system of claim 49, wherein the interworking gateway receives an  
2 establish request message carried by the first transport technology and converts an  
3 address of the second node borne by the establish request message to an address usable  
4 by the second transport technology, and wherein the interworking gateway employs the  
5 address usable by the second transport technology to send a bearer signaling message to  
6 the second node.

1           51. The system of claim 50, wherein the first technology is ATM and the second  
2 technology is an internet protocol (IP).

1           52. The system of claim 51, wherein the bearer signaling message is in an IP  
2 bearer control protocol and includes a binding identifier obtained from the second node.

1           53. The system of claim 52, wherein after receipt of the bearer signaling  
2 message the second node sends an IP response message to the interworking gateway,  
3 the IP response message including information enabling establishment of a  
4 unidirectional connection from the interworking gateway to the second node.

1           54. The system of claim 53, wherein after receipt of the IP response message,  
2 the interworking gateway sends an establish confirmation message to the first node.

1           55. The system of claim 47, wherein the first node uses an address of the second  
2 node to determine an address for the interworking gateway, and wherein the first node  
3 sends a bearer signaling message to the interworking gateway.

1           56. For use in a telecommunications system having an application layer and a  
2 transport layer, the application layer being a radio network layer, the system comprising  
3 a first node which is connected to use Internet Protocol and a second node, a method  
4 comprising attempting to establish a transport bearer between the first node and the  
5 second node using application level signaling, but when unsuccessful invoking an  
6 interworking function in the transport layer for establishing the transport bearer.

1           57. The method of claim 56, further comprising:



2 the first node including its IP address and IP endpoint identifier for uplink traffic  
3 in an IP transport bearer container sent to the second node in an initiating application  
4 control message;

5 upon receiving an IP transport bearer container from the second node in an  
6 application control response message, considering the transport bearer as being  
7 established, but

8 otherwise invoking the interworking function.

1 58. The method of claim 56, further invoking the interworking function involves  
2 accessing a transport layer interworking gateway connected between the first node and  
3 the second node.

1 59. The method of claim 58, further comprising:  
2 upon receiving at the interworking gateway an establish request message carried  
3 by the first transport technology, converting an address of the second node borne by the  
4 establish request message to an address usable by the second transport technology; and  
5 employing the address usable by the second transport technology to send a bearer  
6 signaling message to the second node.

1 60. The method of claim 59, wherein the first technology is ATM and the  
2 second technology is an internet protocol (IP).

1 61. The method of claim 60, further comprising forming the bearer signaling  
2 message in an IP bearer control protocol and including in the bearing signaling message  
3 a binding identifier obtained from the second node.

1 62. The method of claim 61, further comprising after receipt of the bearer  
2 signaling message, the second node sending an IP response message to the interworking  
3 gateway, the IP response message including information enabling establishment of a  
4 unidirectional connection from the interworking gateway to the second node.

1 63. The method of claim 62, further comprising, after receipt of the IP response  
2 message, the interworking gateway sending an establish confirmation message to the  
3 first node.

1        64. The method of claim 63, further comprising:  
2        the first node using an address of the second node to determine an address for the  
3        interworking gateway; and  
4        the first node sending a bearer signaling message to the interworking gateway.

1        65. A telecommunications system having an application layer and a transport  
2        layer, the application layer being a radio network layer, the system comprising:  
3        a first node;  
4        a second node which is connected to use Internet Protocol;  
5        a transport layer interworking gateway;  
6        wherein the second node obtains address parameters of the transport layer  
7        interworking gateway from the transport layer interworking gateway for inclusion in  
8        application layer signaling to the first node in order to enable the first node to use the  
9        transport layer interworking gateway for the purpose of establishing a transport bearer  
10       between the first node and the second node.

1        66. The system of claim 65, wherein the first node is not an IP-connected node  
2        but the second node is an IP-connected node, wherein upon receipt of an initiating  
3        application message from the first node, the second node obtains from the transport  
4        level interworking gateway a network address of the interworking gateway and a  
5        binding identifier of the interworking gateway to send back to the first node, wherein  
6        the second node establishes a bidirectional IP connection with the interworking  
7        gateway; and wherein the first node uses the network address of the interworking  
8        gateway and the binding identifier of the interworking gateway to establish a connection  
9        with the interworking gateway.

1        67. For use in a telecommunications system having an application layer and a  
2        transport layer, the application layer being a radio network layer; the system comprising  
3        a first node, a second node which is connected to use Internet Protocol; and a transport  
4        layer interworking gateway; a method comprising:  
5        the second node obtaining address parameters of the transport layer interworking  
6        gateway for inclusion in application layer signaling to the first node, thereby enabling  
7        the first node using the transport layer interworking gateway for the purpose of  
8        establishing a transport bearer between the first node and the second node.

1           68. The method of claim 67, wherein the first node is not an IP-connected node  
2 but the second node is an IP-connected node, further comprising:

3           upon receipt of an initiating application message from the first node, the second  
4 node obtaining from the transport level interworking gateway a network address of the  
5 interworking gateway and a binding identifier of the interworking gateway for the  
6 second node to send back to the first node;

7           the second node establishing a bidirectional IP connection with the interworking  
8 gateway;

9           the first node using the network address of the interworking gateway and the  
10 binding identifier of the interworking gateway to establish a connection with the  
11 interworking gateway.

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